REMARKS

Favorable reconsideration of this application is respectfully requested.

Claims 1, 4-15, and 17-25 are pending in this application. Claims 2, 3, and 16 are canceled by the present response without prejudice. Claim 14 was rejected under 35 U.S.C. § 101. Claims 1-3, 7-8, 10-11, 13, 15-17, and 19-20 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. patent 5,563,909 to Nakazawa (herein "Nakazawa '909") in view of U.S. patent 5,710,977 to Nakazawa (herein "Nakazawa '977"). Claim 4 was rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 as applied to claim 1, and further in view of U.S. patent 6,920,192 to Laroia et al. (herein "Laroia"). Claim 5 was rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 further in view of Laroia as applied to claim 4, and further in view of U.S. patent 4,606,047 to Wilkinson. Claim 6 was rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 and further in view of Laroia and further in view of Wilkinson as applied to claim 5, and further in view of U.S. patent 7,035,612 to Kishimoto et al. (herein "Kishimoto"). Claim 12 was rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 as applied to claim 11, and further in view of U.S. patent 6,967,994 to Boer et al. (herein "Boer"). Claim 14 was rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 and further in view of U.S. patent 5,852,630 to Langberg et al. (herein "Langberg"). Claim 18 was rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 as applied to claim 17, and further in view of Wilkinson. Claims 21 and 22 were rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 as applied to claim 17, and further in view of Kishimoto. Claims 23, 24, and 25 were rejected under 35 U.S.C. § 103(a) as unpatentable over Nakazawa '909 in view of Nakazawa '977 and further in view of Boer.

Addressing first the rejection of claim 14 under 35 U.S.C. § 101, that rejection is traversed by the present response.

Claim 14 is directed to a "computer readable medium including computer executable instructions, which when executed by a processor, cause the computer to perform a method comprising:", and claim 14 further recites the method performed by the processor. Applicants submit such subject matter is clearly statutory subject matter as a computer readable medium is clearly an article of manufacture, and is not directed to software per se.

In fact, the basis for the outstanding rejection itself indicates "a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer's program's functionality to be realized, [is] thus statutory". Claim 14 is clearly statutory in that respect as it is directed to a computer readable medium encoded with computer executable instructions.

Thereby, applicants respectfully submit claim 14 is proper under 35 U.S.C. § 101.

Addressing now the above-noted prior art rejections, those rejections are traversed by the present response.

Each prior art rejection to claims 1-22 is based on Nakazawa '909 in view of Nakazawa '977 meeting the limitations of independent claims 1, 14, and 15.

Independent claim 1 is now amended by the present response to incorporate limitations from previously pending dependent claim 2. Independent claims 14 and 15 are similarly amended to recite limitations from previously pending dependent claim 16.

In that respect independent claim 1 now positively recites:

> a controller coupled to said time-to-frequency domain converter and to said signal selector to control said signal selector to select an antenna branch from said plurality of antenna branches responsive to a difference between a signal level at a first frequency and a signal level at a second frequency in a frequency domain output signal for an antenna branch.

Independent claims 14 and 15 are also amended by the present response to now similarly recite:

> determining a measure of multipath fading for the received signal from each antenna from said frequency domain transformed signal by comparing levels of said received signal at two or more frequencies.

The antenna branch selector of the claimed invention operates in a frequency domain rather than in a time domain, and allows selection based on a multipath fading and intersymbol interference rather than upon a received signal strength alone.[1]

With reference to Figures 6a, 6b in the present specification as a non-limiting example, for a given antenna branch, for example "Branch 0" shown in Figure 6a, a measure of multipath distortion and intersymbol interference for a received signal can be determined from the difference d_1 in the signal level of the received signal 600a at a first frequency, and the signal level of the received signal 602a at a second frequency (see also the discussion in the present specification at page 16).

Similarly, for a branch B1 as shown in Figure 6b the measure of multipath fading is represented by the difference d_2 in the signal level of a received signal 600b at a first frequency and the signal level of a received signal 602b at a second frequency.

In the claimed invention, a signal with a least fading may be selected, determined by a comparison of d_1 or d_2 for example, or a selected antenna branch may be deselected when a degree of fading is greater than a threshold value, that is independent of other antenna branches.

The features clarified in each of independent claims 1, 14, and 15 are believed to clearly distinguish over the applied art.

[1] Specification at page 4, second full paragraph.

With respect to the features previously recited in dependent claims 2 and 16, now incorporated into respective independent claims 1, 14, and 15, the outstanding rejections cited Nakazawa '909 particularly at Figure 9, element 50a and at column 7, lines 13-51.[2]

In reply to the above-noted grounds for rejection applicants respectfully submit the disclosures in Nakazawa '909 are not at all directed to the above-recited claim features.

At the cited disclosure in Nakazawa '909 at column 7, lines 13-51, Nakazawa '909 discloses use of a propagation characteristic analyzer 50 that can output power values of the received signals with different frequencies, an adder circuit 50b that can add together the power values, and an accumulating circuit 50c that can accumulate sums obtained in that manner. However, that disclosure in Nakazawa '909 does not disclose or suggest the selection of an antenna branch based on a "difference between a signal level at a first frequency and a signal level at a second frequency in a frequency domain" output signal for an antenna branch. Nakazawa '909 does not disclose or suggest evaluating a difference such as d_1 or d_2 between a signal at a first frequency and a signal at a second frequency in a frequency domain.

Moreover, applicants respectfully submit neither Nakazawa '909 nor Nakazawa '977 is even directed to the same features as in the claimed invention.

Referring to the receiver of Figure 12 of Nakazawa '909, each antenna element 56 of the receiver may receive signals from a plurality of mobile stations. Each mobile station transmits on a slightly different transmission frequency, i.e. f_{T1}, f_{T2},...f_{Tm} (see column 4, lines 42 to 46; and column 11, lines 13 to 15).

For example, taking the signal transmitted from a first transmitter with transmission frequency f_{T1}, and received at a plurality of antenna elements, a plurality of IF signals will be presented at the receiver: f_{T1}-f_{Rm}, f_{T1}-$f_{R(m-1)}$, ...f_{T1}-f_{R1}, one IF signal for each antenna branch.

[2] Office Action of January 3, 2008, pages 7 and 9.

These IF signals are then synthesized and supplied to a propagation characteristic analyzing circuit via a complex FFT deriving circuit, for collective analysis. Based on the results of the propagation characteristics analyses, an antenna branch receiving a transmission from an identical mobile station may be selected (see column 11, lines 27 to 61).

The propagation characteristic analyzing circuit 62 of Figure 12 is described as constructed in the same manner as unit 35 of Figure 3 (see column 11, lines 46 to 50), in which power values of the individual received signals with frequencies f_{T1} to f_{Tm} are output (see column 6, lines 12 to 25). Therefore, circuit 62 provides a power value for IF signal f_{T1}-f_{Rm} corresponding to a first antenna branch 58a, a power value for IF signal f_{T1}-$f_{R(m-1)}$ corresponding to a second antenna branch 58b, and so on. In other words, the propagation characteristics of a signal from an antenna branch are based simply on a single power value measurement.

Similarly, in the broadband propagation characterizing analyzing circuit 50 of Figure 9 of Nakazawa '909, the power values of signal components $f_{T1-n\Delta f},\ldots, f_{T1},\ldots,f_{T1+n\Delta f}$ are simply combined to provide a single power value of the signal for a given antenna branch (see column 6, line 66, to column 7, line 26). There is no indication that any other processing is performed on the signal components. Therefore, for this embodiment, the propagation characteristics of a signal from an antenna branch are also based simply on a single power value measurement.

Applicants submit the approaches of Nakazawa '909 appear to be fundamentally different from the features in claims 1-22 of the present application,

As shown in Figure 6a of the present application as a non-limiting example, for a given antenna branch and received signal, a measure of multipath fading is determined based on a difference between a signal level of the received signal 600a at a first frequency and a

signal level of the received signal 600b at a second frequency in a frequency domain output signal for the antenna branch.

Nakazawa '977 is also similarly not directed to the features as claimed. Nakazawa '977 is concerned with determining the optimal positions of base stations (see column 2, lines 1 to 6; and column 5, lines 37 to 50).

The system in Nakazawa '977 relies on a plurality of identical transmitters located in different spatial positions, and a receiver for receiving the plurality of waves transmitted from the transmitters. Significantly, with the exception of the receiver of Figure 15, all the receivers disclosed in Nakazawa '977 (see Figures 1, 3, 8, 9, 10, 15, and 18) disclose only one antenna branch. Further, the receiver of Figure 15 is described as operating in a similar manner to the other receivers (see the paragraph spanning columns 13 and 14).

However, at column 14, lines 51 to 53, Nakazawa '977 indicates diversity reception can be obtained on the basis of the spectrum produced by the receiver embodied in Figure 15 (see column 14, lines 28 to 50).

Referring to Figure 15 of Nakazawa '977, each receiver unit 35a-35m is described as identical to the receiving unit 8 according to the first embodiment (see column 14, lines 17 to 19), which is depicted in Figure 3. The receiving unit 8 of Figure 3 simultaneously receives a plurality of transmitted waves f_{TX1}-f_{TXn}, where f_{TXn}, is a transmitted wave that is transmitted from one of a plurality of transmitters (see Figure 1; and column 5, lines 11 to 23).

Each transmitted wave, f_{TXn}, includes a set of spectral components $f_{n(1)}$-$f_{n(K)}$. An exemplary spectrum of the transmitted wave f_{TX1}, in the frequency domain is depicted in Figure 4(B).

An exemplary spectrum including all of the transmitted waves in the frequency domain for a single antenna branch is depicted in Figure 5. Each of the spectra in Figure 16, i.e. Sa-Sm, is comparable to the spectrum of Figure 5 (see column 14, lines 30 to 33), but

with spectra Sb to Sm shifted by a frequency *n*fs. The combined spectrum is depicted at the bottom of Figure 16 (see column 14, lines 28 to 50).

No further indication in Nakazawa '977 is provided as to how diversity reception based on the combined spectrum (column 14, lines 51 to 53) is obtained, though the analyzer 11 of Figure 15 is described as being identical to that of the first embodiment of the invention (see Figure 3 and column 14, lines 6 to 10).

In particular, in Figure 3, a received wave measuring unit 10 calculates electric power values of the respective transmitted waves f_{TX1}-f_{TXn} based on the spectrums, and the analyzer 11 makes various analyses of multipath propagation characteristics based on the calculated power values (column 5, lines 32 to 36).

Thus, the approach adopted in Nakazawa '977 appears to be comparable to the broadband propagation characterization of Nakazawa '909; that is, combining the power values of the components of a signal to provide a single power value for a given antenna, and comparing the power values of two or more antennas.

For these further reasons, neither Nakazawa '977 nor Nakazawa '909 disclose or suggest a controller configured to control the signal selector to select an antenna branch responsive to a difference between a signal level at a first frequency of the received signal and a signal level at a second frequency of the received signal in the frequency domain output for the antenna branch, as recited in independent claim 1.

Similarly, neither Nakazawa '977 nor Nakazawa '977 disclose or suggest determining a measure of multipath fading for the received signal from each the antenna from the frequency domain transformed signal by comparing levels of the received signal at two or more frequencies, as recited in independent claims 14 and 15.

In view of the foregoing comments, applicants respectfully submit each of independent claims 1, 14, and 15, and thereby the claims dependent therefrom, patentably distinguish over Nakazawa '909 in view of Nakazawa '977.

Moreover, with respect to claims 1-22 applicants respectfully submit none of the further cited art to Laroia, Wilkinson, Kishimoto, Boer, or Langberg cure the above-noted deficiencies of Nakazawa '909 in view of Nakazawa '977.

With respect to claims 23-25, applicants respectfully submit those claims also distinguish over the applied art.

The outstanding rejection to claims 23-25 cites Nakazawa '909 in view of Nakazawa '977 and further in view of Boer to meet the limitations therein. In the statement for the rejection the outstanding Office Action cites Boer to teach "means for determining a Doppler frequency change of said received signal", citing Boer at column 2, lines 48-54.[3]

Applicants traverse that grounds for rejection and submit Boer does not disclose or suggest such a feature, or any "reselecting" of a received signal condition upon a determined frequency change being greater than a threshold frequency, as also recited in claims 23-25.

Applicants submit the cited text in Boer refers to using a longer preamble to help counter "harsh environments". Applicants submit such a disclosure in Boer does not encompass Doppler effects, which induce time variations in a channel. Although different preamble lengths can be used to help counter various propagation conditions, short and long preambles are likely to face the same problems if there is significant Doppler induced time variations in a channel. Therefore, simply selecting a longer preamble as noted in Boer does not address countering Doppler effects.

[3] Office Action of January 3, 2008 page 20, lines 6-7.

Therefore, Boer is not related to features even similar to the subject matter of claims 23-25 and would not have been considered by one of ordinary skill in the art to be directed to such features.

Applicants further submit there is no indication that any thresholds in Boer are based on anything other than a signal-to-noise ratio, signal strength, or signal peak value as noted in Boer at column 3, lines 48-53 and column 6, lines 30-35.

Thereby, applicants submit Boer does not disclose providing any disclosure or teaching that would enable one of ordinary skill in the art to determine a Doppler frequency change of a received signal or reselecting a received signal conditional upon a determined frequency change being greater than a threshold frequency.

In such ways, applicants respectfully submit claims 23-25 distinguish over the previously applied art to Nakazawa '977 in view of Nakazawa '909 and further in view of Boer.

In view of the present response applicants respectfully submit each of the claims as currently written patentably distinguishes over the previously applied art.

As no other issues are pending in this application, it is respectfully submitted that the present application is now in condition for allowance, and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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